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RESEARCH ARTICLE

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Chromosome numbers for the Italian flora: 12

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Abstract

In this contribution, new chromosome data obtained on material collected in Italy are presented. It includes the first counts for *Hieracium glanduliferum* s.str. and *H. tenuiflorum*, counts for two *Armeria* species endemic to Italy, and for *Onopordum illyricum* subsp. *illyricum*. We also present here the first chromosome count of *Allium permixtum* for Italy, where this species is known for few localities.

Keywords

Amaryllidaceae, Asteraceae, cytotaxonomy, endemics, Plumbaginaceae, polyploidy

How to contribute

Texts concerning new chromosome data should be submitted electronically to Giovanni Astuti (giovanni.astuti@unipi.it), including indications on voucher specimens and methods used.

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Chromosome counts

Allium permixtum Guss. (Amaryllidaceae)

Chromosome number. $2n = 24$ (Fig. 1).

Voucher specimen. Italy. Abruzzo. Rocca di Cambio (L'Aquila), Monte Ocre, vallone Canavine conca di Settacque, prati umidi, 1570 m (WGS84: 42.2471477N, 13.442932E), 22 June 2005, *F. Conti, F. Bartolucci, L. Bernardo, D. Iamonico, M. Latini, I. Londrillo, R. Lorenzetti, N. Ranalli, E. Pellegrini, L. Peruzzi, N. Ranalli, E. Scassellati, D. Tinti, V. Viscosi* (APP15719, APP15721).

Method. Squash preparations were made on root tips obtained from cultivated plants. Root tips were pre-treated with 0.4% colchicine for 4 h and then fixed in Carnoy solution for 1 h. After hydrolysis in 1N HCl at 60 °C, the tips were stained with leuco-basic fuchsine.

Observations. *Allium permixtum* occurs in Italy and the Balkan Peninsula (Anderson 1991; Conti 1995; Cheshmedzhiev and Marinov 2009; Brullo et al. 2010; Hallaçi and Shuka 2013; Bartolucci et al. 2018). In Italy, this species was not recently confirmed in Sicily (Brullo et al. 2010) and is very rare in Abruzzo, where it has been recorded only for some protected areas of the central Apennines, such as the National Park of Gran Sasso and Monti della Laga (Conti 1998; Conti and Bartolucci 2016) and the National Park of Abruzzo, Lazio and Molise (Conti 1995; Conti and Bartolucci 2015). The population studied here represents the first record for the Regional Park of Sirente-Velino (Abruzzo, central Italy). This is also the first chromosome count for the species in Italy (Bedini and Peruzzi 2021 onwards), and it agrees with previous counts made for Greece and Bulgaria where both diploid and triploid cytotypes have been reported ($2n = 2x = 16$, $2n = 3x = 24$) (Tzanoudakis 1982, 1986; Cheshmedzhiev and Marinov 2009, in both sources under the name *A. phthioticum*).

F. Bartolucci, F. Conti

Figure 1. *Allium permixtum* Guss. from Monte Ocre (Rocca di Cambio, L'Aquila), $2n = 24$. Scale bar: 10 μm.

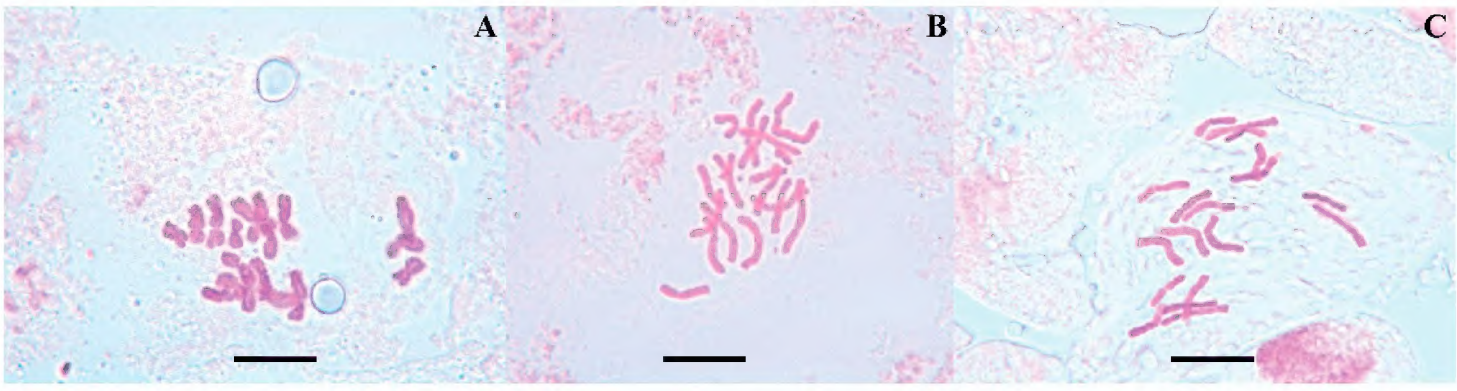

Figure 2. *Armeria denticulata* (Bertol.) DC. from (**a**) Castello della Brina (Sarzana, La Spezia), (**b**) Poggio Pelato (Rosignano, Livorno), and (**c**) Monteferrato (Prato), $2n = 18$. Scale bar: 10 µm.

Armeria denticulata (Bertol.) DC. (Plumbaginaceae)

Chromosome number. $2n = 18$ (Fig. 2).

Voucher specimens. Italy. Liguria. Sarzana (La Spezia), nei pressi del castello della Brina (WGS84: 44.14732N, 9.95068E), 11 June 2021, *L. Sandroni* (PI049856–PI049876). **Toscana.** Rosignano Marittimo (Livorno), Poggio Pelato (WGS84: 43.43525N, 10.43103E), 25 May 2021, *L. Sandroni & G. Astuti* (PI049924–PI049948); Prato, Monteferrato (WGS84: 43.92042N, 11.07572E), 9 June 2021, *L. Sandroni* (PI049902–PI049923).

Method. Squash preparations were made on root tips obtained from germinating seeds. Root tips were pre-treated with 0.4% colchicine for 3 hours and then fixed in Carnoy fixative solution for 1 hour. After hydrolysis in HCl 1N at 60 °C, the tips were stained in leuco-basic fuchsine for 7–8 minutes.

Observations. This species is endemic to ophiolitic substrates of western Liguria and Toscana (Arrigoni 2015). The type locality of this species is in Liguria, but very close to the border with Toscana, where the vast majority of populations is found. We report here three counts, one obtained from plants collected in the type locality and two from elsewhere in Toscana. These data confirm the $2n = 18$ chromosome number reported for Impruneta, Firenze (Arrigoni et al. 1976, 1980). This is also the only known number for the entire genus (Rice et al. 2014+).

Armeria saviana Selvi (Plumbaginaceae)

Chromosome number. $2n = 18$ (Fig. 3).

Voucher specimen. Italy. Toscana. Arcidosso (Grosseto), Stribugliano, lungo la Via del Campo Sportivo (WGS84: 42.85868N, 11.47165E), 28 May 2021, *L. Sandroni & G. Astuti* (PI049882–PI049886).

Method. Squash preparations were made on root tips obtained from germinating seeds. Root tips were pre-treated with 0.4% colchicine for 3 hours and then fixed in Carnoy fixative solution for 1 hour. After hydrolysis in HCl 1N at 60 °C, the tips were stained in leuco-basic fuchsine for 7–8 minutes.

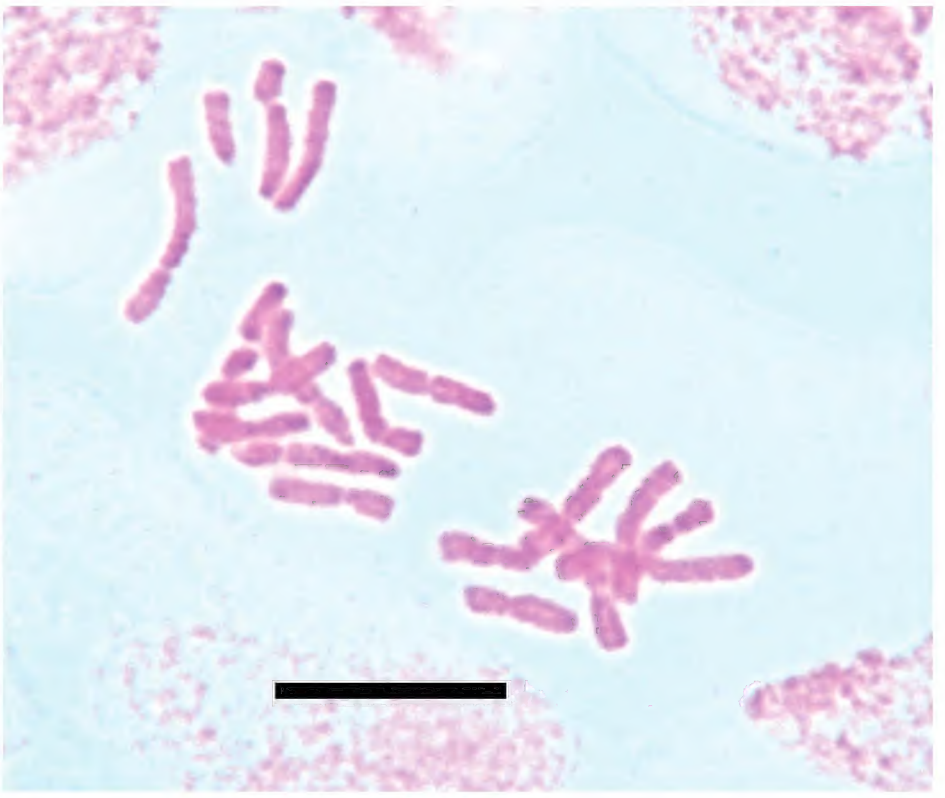

Figure 3. *Armeria saviana* Selvi from Stribugliano (Arcidosso, Grosseto), $2n = 18$. Scale bar: 10 µm.

Observations. This species is endemic to southern Toscana, and has been only recently described (Selvi 2009). It shows a very narrow distribution range on the surroundings of Monte Labbro (Grosseto). *Armeria saviana* is morphologically very similar to *A. denticulata*, from which it can be distinguished for a few leaf and inflorescence features. The chromosome count reported here confirms the previous count published by Selvi (2009).

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Hieracium glanduliferum Hoppe subsp. *glanduliferum* (Asteraceae)

Chromosome number. $2n = 27$ (Fig. 4).

Voucher specimen. Italy. Emilia-Romagna. Ventasso (Reggio Emilia), Monte Prado (WGS84 44.252477N, 10.400372E), tra la sella e la vetta del Monte Prado, 1980 m, 25 July 2019, *S. Orsenigo* (PAV).

Method. Squash preparations were made on root tips obtained from germinating seeds. Root tips were pre-treated with 0.4% colchicine for 3 hours and then fixed in Carnoy fixative solution for 1 hour. After hydrolysis in HCl 1N at 60 °C, the tips were stained in leuco-basic fuchsine for 7–8 minutes.

Observations. *Hieracium glanduliferum* subsp. *glanduliferum* is a south European alpine species with isolated populations that occur in the northern Apennines on Monte Prado, Monte Cusna, and Monte Cimone (Foggi and Ricceri 1989; Gottschlich 2018). This is the first count for this taxon for Italy, whereas other counts have been published for *Hieracium glanduliferum* Hoppe subsp. *piliferum* Hoppe ex Nägeli & Peter, for which two different chromosome numbers have been reported so far, $2n = 3x = 27$ from Italy, Switzerland, and Austria (Scholte 1977; Chrtek et al. 2009) and $2n =$

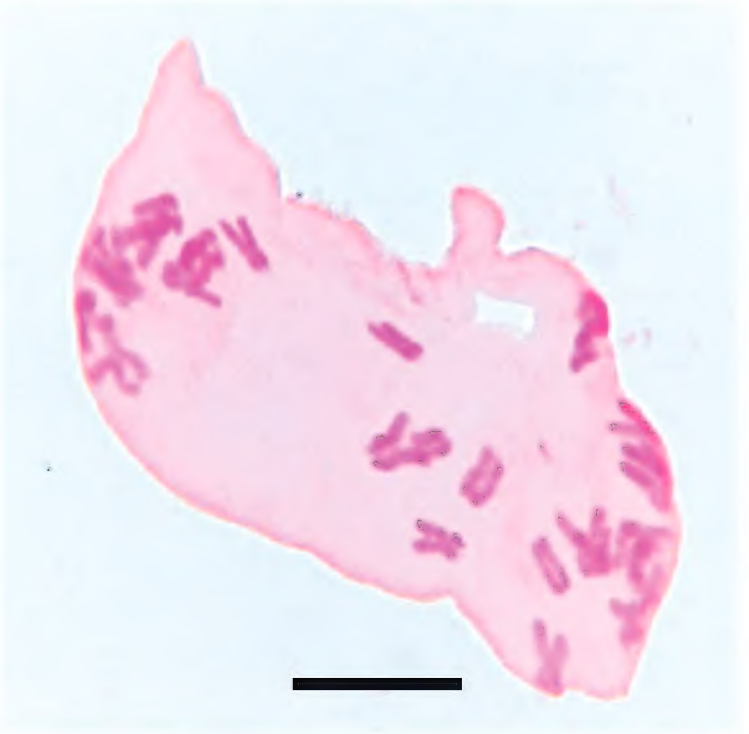

Figure 4. *Hieracium glanduliferum* Hoppe subsp. *glanduliferum* from Monte Prado (Ventasso, Reggio Emilia), $2n = 27$. Scale bar: 10 μm.

$4x = 36$ from Austria and Slovakia (Mráz 2003; Chrtek et al. 2009, in all sources under the name *Hieracium piliferum* Hoppe).

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***Hieracium tenuiflorum* Arv.-Touv. (Asteraceae)**

Chromosome number. $2n = 27$ (Fig. 5).

Voucher specimen. Italy. Liguria. Sanremo (Imperia), San Romolo (WGS84 43.84670N, 7.740880E), pendici del Monte Bignone, margine della strada verso Sanremo, 570 m, 28 May 2021, *M. Ottonello, B. Cera, S. Orsenigo* (PAV).

Method. Squash preparations were made on root tips obtained from germinating seeds. Root tips were pre-treated with 0.4% colchicine for 3 hours and then fixed in Carnoy fixative solution for 1 hour. After hydrolysis in HCl 1N at 60 °C, the tips were stained in leuco-basic fuchsine for 7–8 minutes.

Observations. *Hieracium tenuiflorum* is a south European perennial species (Gottschlich 2018). It was originally described for Monte Bignone, Monte Ceppo, and Monte Arpetta (Bicknell 1896), in the Ligurian Alps. In Italy, this species is widespread throughout the Alps and pre-Alps, but it occurs also in the northern and central Apennines south up to Abruzzo (Bartolucci et al. 2018).

The chromosome number $2n = 3x = 27$, reported here for the first time, is consistent with observations made in other taxa belonging to *H.* sect. *Hieracium*, such as those of the *H. murorum* aggregate in Italy (Selvi and Fiorini 1996; Geraci et al. 2007) and Europe (Chrtek et al. 2009).

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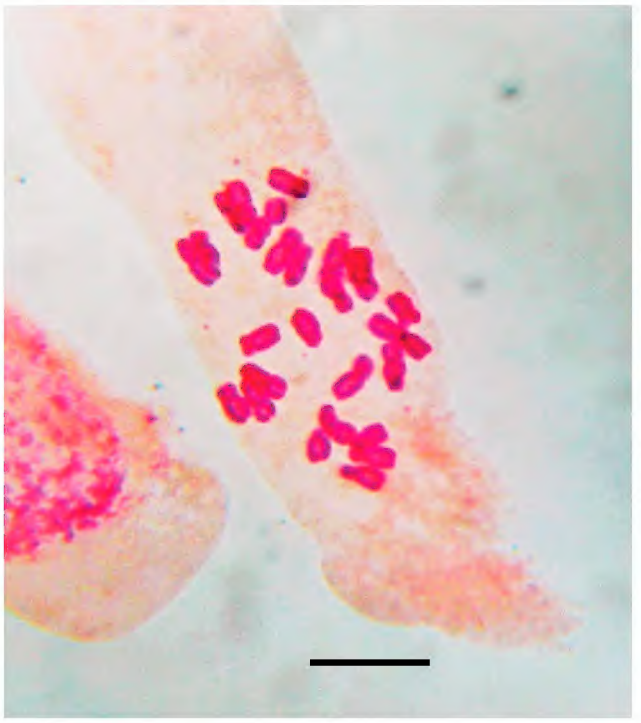

Figure 5. *Hieracium tenuiflorum* Arv.-Touv. from San Romolo (Sanremo, Imperia), $2n = 27$. Scale bar: 10 μm.

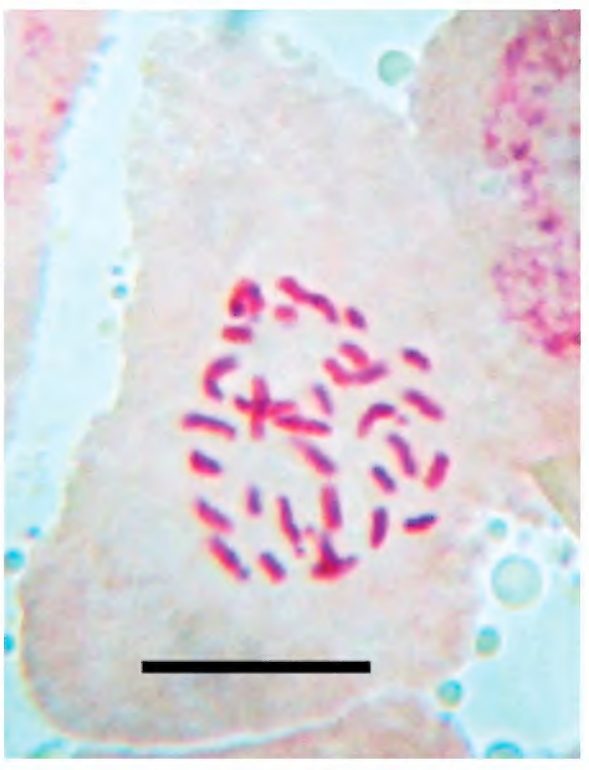

Figure 6. *Onopordum illyricum* L. subsp. *illyricum* from c.da Rossillo (San Marco Argentano, Cosenza), $2n = 34$. Scale bar: 10 μm.

Onopordum illyricum L. subsp. *illyricum* (Asteraceae)

Chromosome number. $2n = 34$ (Fig. 6).

Voucher specimen. Italy. Calabria. San Marco Argentano (Cosenza), c.da Rossillo (WGS84: 39.61343N, 16.22801E), 16 August 2021, *L. Peruzzi* (seeds collected and deposited at the germplasm bank of the Department of Biology, University of Pisa; IPEN: IT-0-PI-2021-0419).

Method. Squash preparations were made on root tips obtained from germinating seeds. Root tips were pre-treated with 0.4% colchicine for 3 hours and then fixed in

Carnoy fixative solution for 1 hour. After hydrolysis in HCl 1N at 60 °C, the tips were stained in leuco-basic fuchsine for 7–8 minutes.

Observations. This species occurs in southern Europe, from the Iberian Peninsula to the Balkans, in Turkey, and in Syria (Greuter 2006+). Although several chromosome counts are available in the literature (Moore and Frankton 1962; Chuksanova et al. 1968; Valdes 1970; Kuzmanova et al. 1979; Snogerup 1995), no data have been published so far for Italy, where two subspecies can be found, i.e., *O. illyricum* subsp. *illyricum*, distributed throughout south-central Italy (including Sardegna and Sicilia), and *O. illyricum* subsp. *carduncul*us (Boiss.) Arènes, which is known only for Sicilia (Bartolucci et al. 2018). We confirm here the chromosome number $2n = 34$ previously reported for the species.

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